Internal 40V MOSFET Switching Regulator IC for Buck Converter

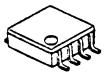
■ GENERAL DESCRIPTION

The **NJW4150A** is a buck converter with **40V/300mA** MOSFET. It corresponds to high oscillating frequency, and Low ESR Output Capacitor (MLCC) within wide input range from 6.2V to 40V. Therefore, the **NJW4150A** can realize downsizing of an application with a few external parts.

Also, it has a soft start function, an over current protection and a thermal shutdown circuit.

It is suitable for logic voltage generation from high voltage that Car Accessory, Office Automation Equipment, Industrial Instrument and so on.

■ PACKAGE OUTLINE



NJW4150ARB1

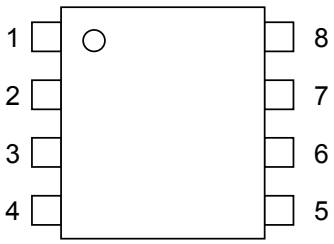
■ FEATURES

- Maximum Rating Input Voltage 45V
- Wide Operating Voltage Range 6.2V to 40V
- Switching Current 450mA min.
- PWM control
- Correspond to Ceramic Capacitor (MLCC)
- Oscillating Frequency 1MHz typ. (A ver.)
- Soft Start Function 4ms typ.
- UVLO (Under Voltage Lockout)
- Over Current Protection
- Thermal Shutdown Protection
- Standby Function
- Package Outline NJW4150ARB1: MSOP8(TVSP8)* *MEET JEDEC MO-187-DA/THIN TYPE

■ PRODUCT CLASSIFICATION

Part Number	Version	Oscillating Frequency	Operating Temperature Range
NJW4150ARB1-A	A	1,000kHz typ.	General Spec. -40°C to +125°C

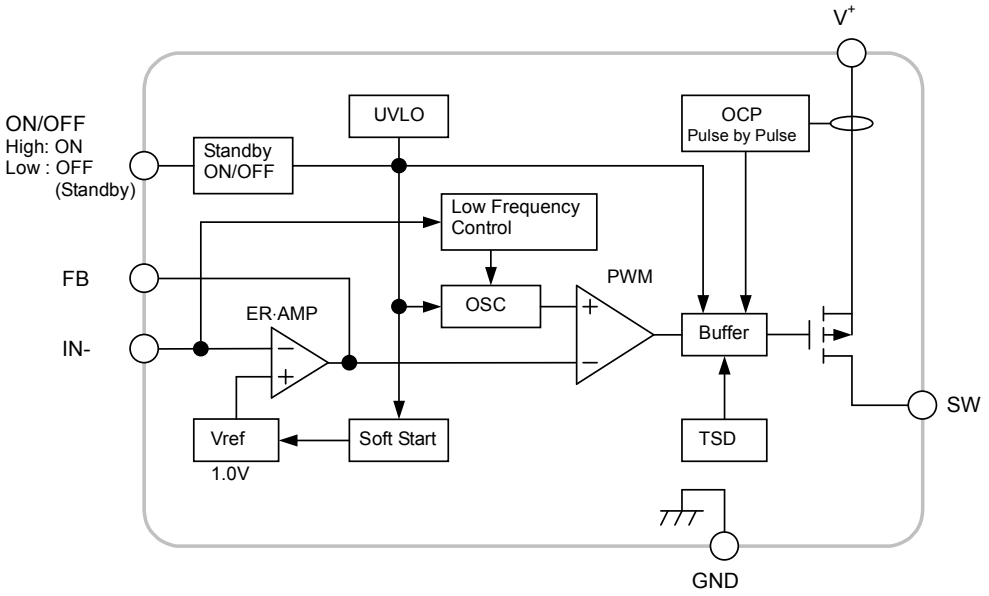
■PIN CONFIGURATION



NJW4150ARB1

PIN FUNCTION
1. SW
2. N.C.
3. V^+
4. ON/OFF
5. FB
6. IN-
7. N.C.
8. GND

■BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Supply Voltage	V^+	-0.3 to +45	V
V^+- SW pin Voltage	V_{V-SW}	+45	V
IN- pin Voltage	V_{IN-}	-0.3 to +6	V
ON/OFF pin Voltage	$V_{ON/OFF}$	-0.3 to +45	V
Power Dissipation	P_D	580 (*1) 780 (*2)	mW
Junction Temperature Range	Tj	-40 ~ +150	°C
Operating Temperature Range	T_{opr}	-40 ~ +125	°C
Storage Temperature Range	T_{stg}	-50 ~ +150	°C

(*1): Mounted on glass epoxy board. (76.2×114.3×1.6mm:EIA/JDEC standard size, 2Layers)

(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm:EIA/JDEC standard size, 4Layers),
internal Cu area: 74.2×74.2mm

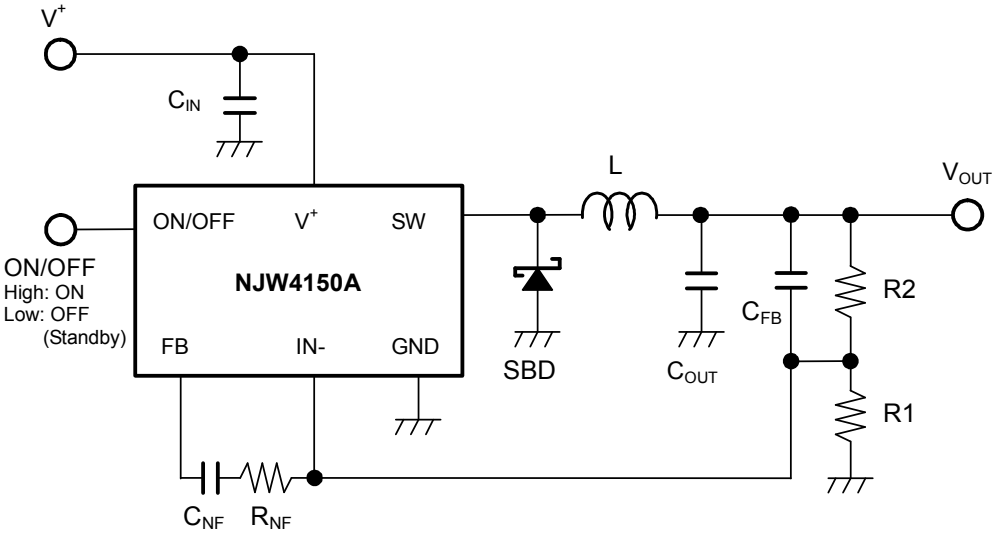
■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+	6.2	–	40	V

■ ELECTRICAL CHARACTERISTICS (V^+=$V_{ON/OFF}$=24V, Ta=25°C)

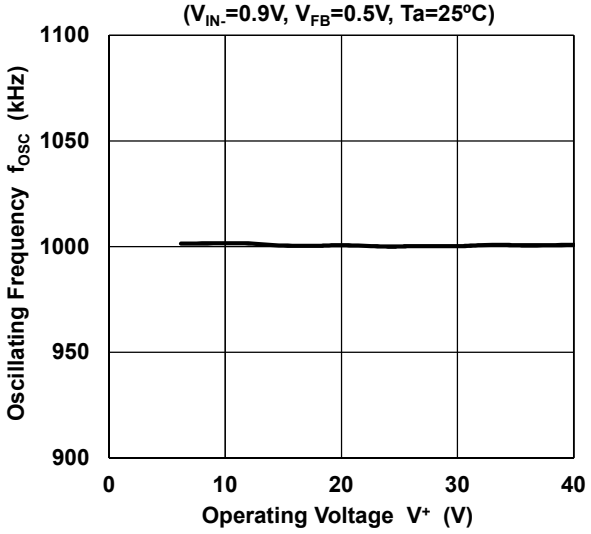
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V_{T_ON}	V^+ = L → H	5.6	5.9	6.2	V
OFF Threshold Voltage	V_{T_OFF}	V^+ = H → L	5.4	5.7	6.0	V
Hysteresis Voltage	V_{HYS}		150	200	–	mV
Soft Start Block						
Soft Start Time	t_{SS}	V_B=0.95V	2	4	8	ms
Oscillator Block						
Oscillating Frequency	f_{OSC}	A version V_{IN-}=0.9V, V_{FB}=0.5V	900	1,000	1,100	kHz
Oscillating Frequency OCP operates	f_{OSC_LIM}	V_{IN-}=0V, V_{FB}=0.5V	–	333	–	kHz
Oscillating Frequency deviation (Supply voltage)	f_{DV}	V^+=6.2V to 40V	–	1	–	%
Oscillating Frequency deviation (Temperature)	f_{DT}	Ta=-40°C to +85°C	–	5	–	%
Error Amplifier Block						
Reference Voltage	V_B		-1.0%	1.00	+1.0%	V
Input Bias Current	I_B		-0.1	–	0.1	μA
PWM Comparator Block						
Maximum Duty Cycle	$M_{AX}D_{UTY}$	V_{IN-}=0.9V	100	–	–	%
Output Block						
Output ON Resistance	R_{ON}	I_{SW}=300mA	–	1.0	1.45	Ω
Switching Current Limit	I_{LIM}		450	600	750	mA
SW Leak Current	I_{LEAK}	$V_{ON/OFF}$=0V, V^+=40V, V_{SW}=0V	–	–	1	μA
ON/OFF Block						
ON Control Voltage	V_{ON}	$V_{ON/OFF}$= L → H	1.6	–	V^+	V
OFF Control Voltage	V_{OFF}	$V_{ON/OFF}$= H → L	0	–	0.3	V
General Characteristic						
Quiescent Current	I_{DD}	R_L=no load, V_{IN-}= 0.9V, V_{FB}=0.5V	–	2.75	3.1	mA
Standby Current	I_{DD_STB}	$V_{ON/OFF}$=0V	–	–	1	μA

■ TYPICAL APPLICATIONS

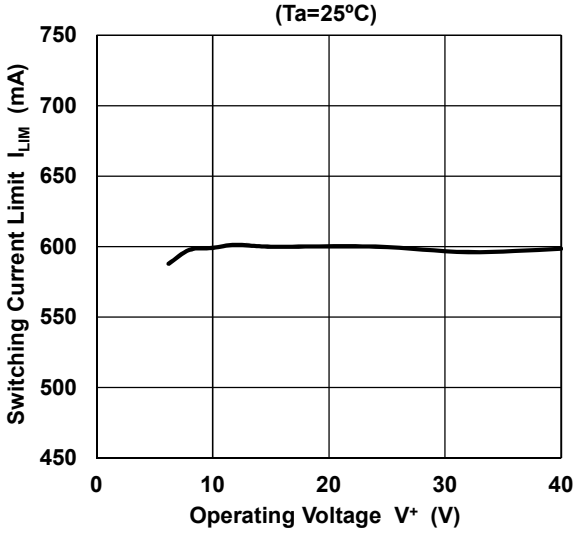


■TYPICAL CHARACTERISTICS

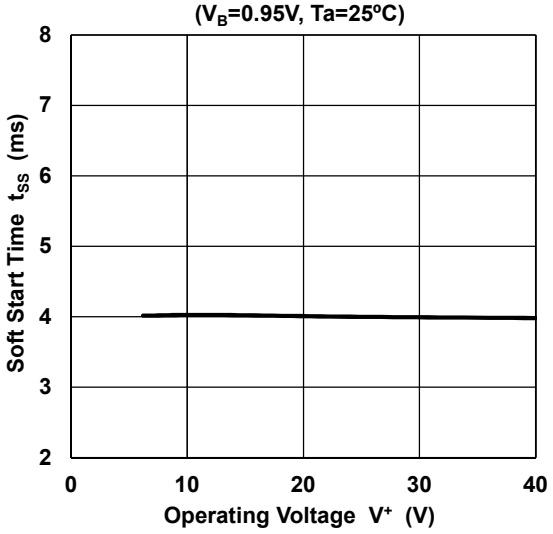
Oscillating Frequency vs. Operating Voltage
(V_{IN-}=0.9V, V_{FB}=0.5V, Ta=25ºC)



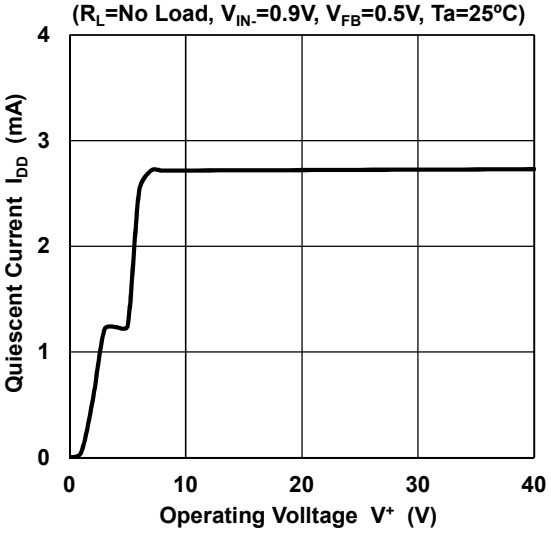
Switching Current Limit vs. Operating Voltage
(Ta=25ºC)



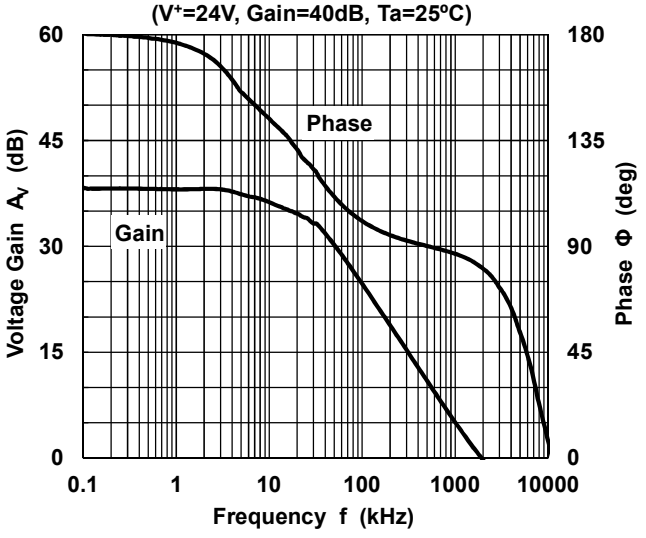
Soft Start Time vs. Operating Voltage
(V_B=0.95V, Ta=25ºC)



Quiescent Current vs. Operating Voltage
(R_L=No Load, V_{IN-}=0.9V, V_{FB}=0.5V, Ta=25ºC)

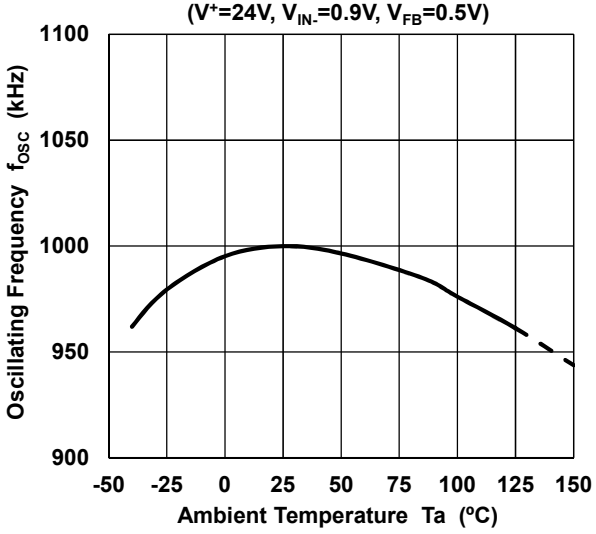


Error Amplifier Block
Voltage Gain, Phase vs. Frequency
(V^+=24V, Gain=40dB, Ta=25ºC)

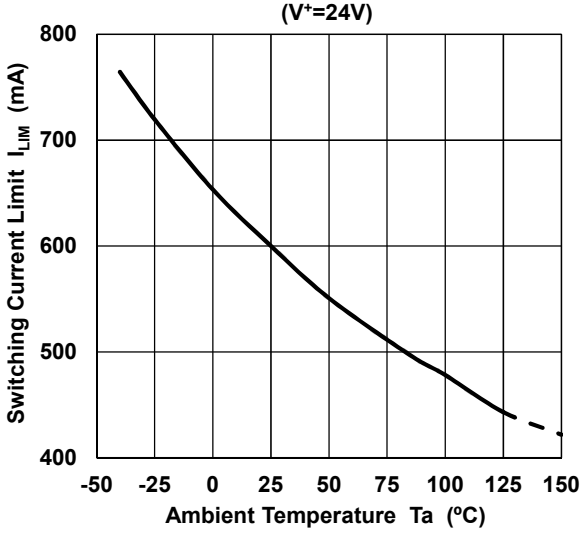


■TYPICAL CHARACTERISTICS

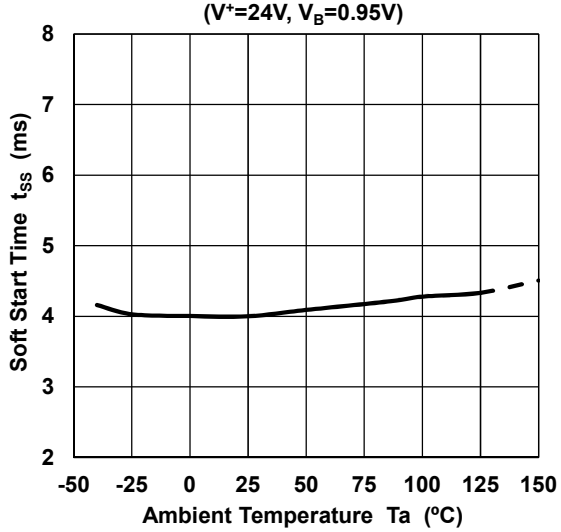
Oscillating Frequency vs. Temperature
(V^+=24V, V_{IN-}=0.9V, V_{FB}=0.5V)



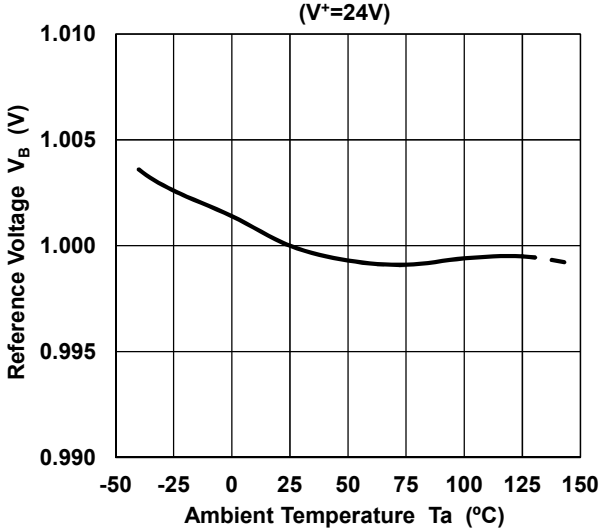
Switching Current Limit vs. Temperature
(V^+=24V)



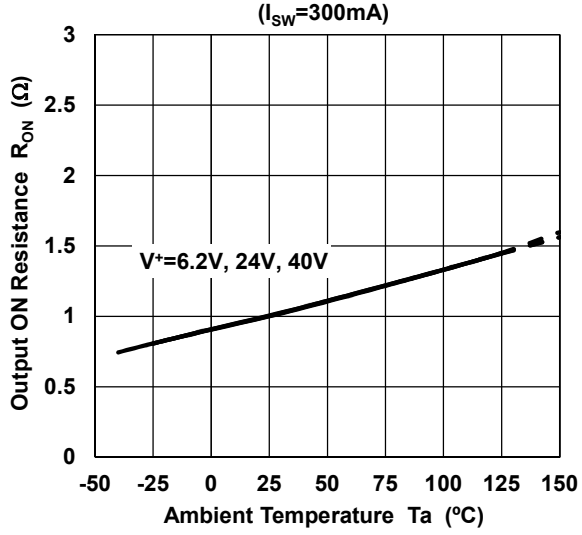
Soft Start Time vs. Temperature
(V^+=24V, V_B=0.95V)



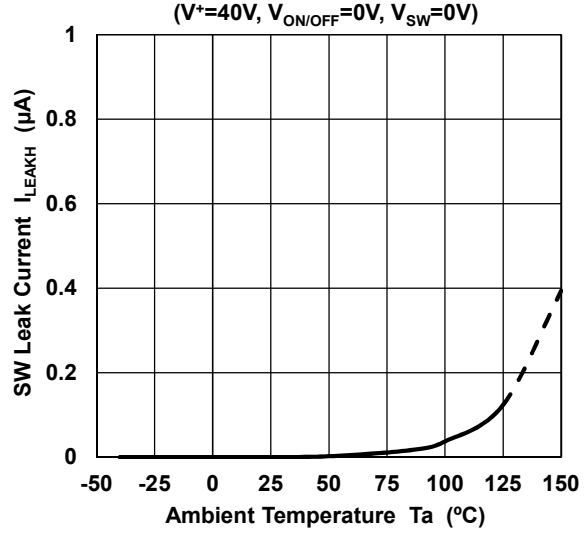
Reference Voltage vs. Temperature
(V^+=24V)



Output ON Resistance vs. Temperature
(I_{SW}=300mA)

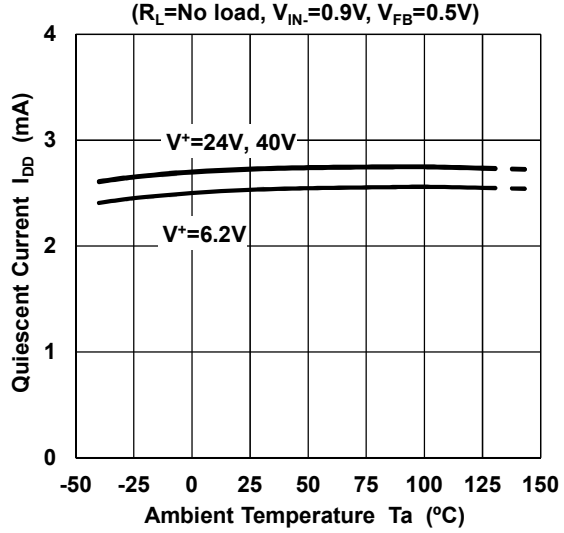


SW Leak Current vs. Temperature
(V^+=40V, $V_{ON/OFF}$=0V, V_{SW}=0V)

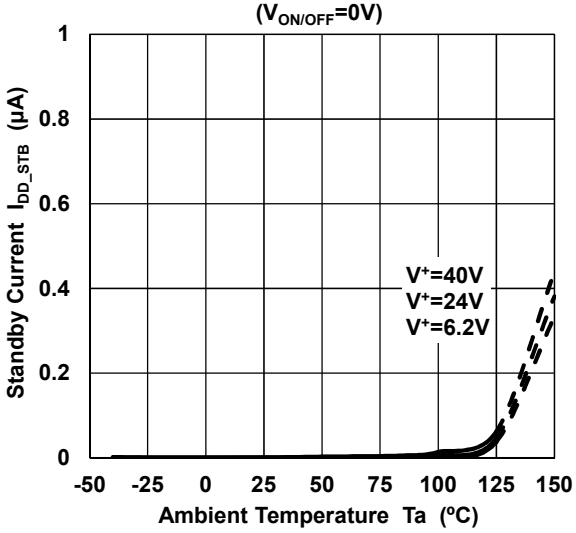


■TYPICAL CHARACTERISTICS

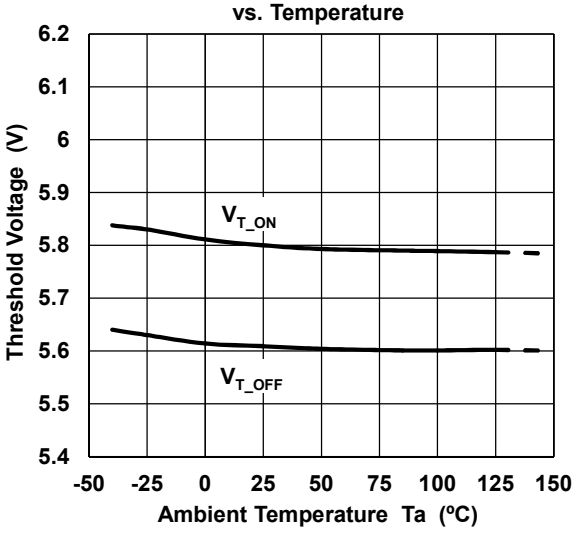
Quiescent Current vs. Temperatue
(R_L=No load, V_{IN-}=0.9V, V_{FB}=0.5V)



Standby Current vs. Temperature
($V_{ON/OFF}$=0V)



Under Voltage Lockout Block
vs. Temperature



MEMO

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